The aim of this study is to explore what implications park expansion have on access to resources, with particular emphasis on useful plants as an indicator. A checklist of potentially useful plants was compiled for the proposed Heritage Park and surrounding areas based on varying sampling methods. Distribution data was spatially arranged according to Quarter Degree Grids (QDGs). To confirm or reject the people's claims towards a rich resource base, the results of the useful plant assessment were calculated and subjected to spatial statistics using kriging method to map broad patterns of distributions. Mapping units are grids comprising 50 QDGs (225 km^2 each). For each of these grids, the number of useful plants found was calculated under different use categories. This allowed for the calculation of α-diversity for comparative purposes and to provide an indication of the value of specific areas to the local people. Ordinations of data will be conducted using Non-metric Multidimensional Scaling to investigate links between useful plant diversity and human population density/distance from settlements. Surveys were conducted to assess the needs and views of the local community during the development of the Heritage Park. Future assessment will determine the degree to which indigenous knowledge systems are infused and imbedded within the park expansion initiative.

doi:10.1016/j.sajb.2010.02.072

Sequencing the avocado transcriptome

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Avocados are grown commercially in almost 50 countries, with the South African avocado industry making an important contribution to the world's avocado supply. In 2007 the total South African avocado production was 65 000 tonnes and the gross value R226 million making the country one of the world's largest exporters. One of the most serious threats to the avocado industry is *Phytophthora cinnamomi.* The pathogen infects the plant via the feeder roots causing Phytophthora root rot (PRR) and leads to the death of the plant within 3 years. The aim of the study was to identify genes related in tolerance against PRR and aid in the transcriptome assembly of avocado roots. To achieve this, 454 pyrosequencing of pre-infected and post-infected, tolerant R0.09 avocado feeder root cDNA libraries was done, in order to elucidate genes involved in the defence response to *P. cinnamomi*. A total of 2 Mb of data was produced using a single lane on the GS-FLX platform; this generated approximately 10 000 reads from which 370 contigs were constructed using the Newbler assembly program. Further characterisation of the sequence data was done using the CAS program and the NCBI database. Approximately 20 putative defence related genes have been identified and will be further analyzed and quantified. This study is the first step in elucidating the avocado transcriptome as well as host-specific defence responses.

doi:10.1016/j.sajb.2010.02.073

Tree layer species composition of the Nylsvley Nature Reserve woodland community in Limpopo Province, South Africa

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A Point-Centered-Quarter (PCQ) sampling method was used on 35 sampling points to determine importance value (IV) on plants species found in one of the woodlands of Nysvley Nature Reserve. From the 35 sampling points twelve plant species were found with their importance value as follows: *Burkea africana* (89.7), *Terminalia sericea* (75.9), *Dichrostachys cinerea* (52.1), *Peltophorum africanum* (19.9), *Ochna pulcra* (18.7), *Dombeya rotundifolia* (14.6), *Grewia flavescens* (8.8), *Acacia karroo* (4.6), *Ziziphus mucronata* (2.96), *Combretum molle* (2.93), *Lannea discolor* (5.27) and *Securidaca longependiculata* (4.2). None of these species is vulnerable or endangered. However *B. africana* and *T. sericea* with their highest importance values are, therefore, the cornerstone of the woodland vegetation sampled.

doi:10.1016/j.sajb.2010.02.074

Elucidation of defence responses induced by aphid saliva

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The use of biotic elicitors in plant disease management has a potential of activating mechanisms of plant resistance, simultaneously increasing host resistance to pests. In pursuit of the eliciting potential in the Russian wheat aphid–wheat (*Diuraphis noxia–Triticum aestivum*) interaction, salivary material of the Russian wheat aphid (biotypes 1 and 2) was collected from artificial feeding chambers. The crude salivary material was intercellularly injected into different wheat cultivars and induced defence responses determined at different times after treatment. The crude salivary material of the two aphid biotypes differentially induced defence responses in the different wheat cultivars used. Salivary material of the biotype 2 aphid stimulated the highest degree of induction of some of the defence responses investigated. The level of induced activity varied among the defence responses studied and induction of peroxidase activity was the strongest in all treatments. Partial fractionation of the salivary material yielded fractions that differentially induced defence responses in the wheat cultivars

used. The project further determines the nature of the elicitor-active fractions.

doi:10.1016/j.sajb.2010.02.075

A comparative floristic analysis of peri-urban and rural homegardens in North-West, South Africa

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The Tswana *tshimo* (homegarden) is an Indigenous Knowledge System. However, there is a general belief that gardens of indigenous cultures are spontaneous and disorganised. This study considers this by comparing peri-urban and traditional rural homegardens in North-West to (1) assess the useful-plant diversity, (2) determine the origin of the species (alien or indigenous), (3) examine the different use categories, and (4) document the positions of plants within indigenous gardening systems. We conducted a survey of 61 homegardens from rural and 51 from peri-urban areas in North-West. A total of 183 useful plants species belonging to the 66 plant families were recorded, comprising 64 medicinal, 80 food, 23 shade, and 16 hedge plants. Few of these useful plant species (26%) are indigenous (semi-wild domesticates), while the majority (74%) are aliens (naturalised and cultivated exotics). The five most often cultivated plant species (50–70% frequency) were *Prunus persica*, *Schinus molle*, *Ligustrum lucidum*, *Zea mays* and *Vitis vinifera*. A comparison between rural and peri-urban gardens revealed that rural gardens have a higher mean species richness (51 compared to 39), and 54% of the gamma diversity are alien in contrast to the 67% of peri-urban gardens. Nearly 63% of the plants from the peri-urban homesteads were cultivated, whereas 46% of the species from the rural gardens occur naturally. No significant difference was evident with regard to different use categories. Homegarden floras are collectively planted and positioned according to cultural practices passed down generations, resulting in a common layout plan which is repeated in the gardens of rural areas, but is absent from the peri-urban areas.

doi:10.1016/j.sajb.2010.02.076

Establishment of *Artemisia* sp. plant cell suspension cultures

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Malaria continues to pose major health threat to Sub-Saharan Africa. The sesquiterpene lactone artemisinin produced in the plant *Artemisia annua* has shown to be effective against quinoline resistant malaria strains. In an effort to improve large scale production of this compound in plant cell systems, we undertook to establish plant cell suspension cultures of *A. annua* for production of artemisinin. We simultaneously developed a protocol for producing *Artemisia afra* cell suspension culture. *A. afra*, an indigenous African plant, lacks the key enzyme to convert artemisnic acid to artemisinin. Future work will involve elicitation of artemisinin and its precursors in cell suspension cultures, and potential manipulation of *A. afra* cell suspension cultures to produce artemisinin.

doi:10.1016/j.sajb.2010.02.077

A micropropagation protocol for *Siphonochilus aethiopicus*, an endangered South African medicinal plant

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Siphonochilus aethiopicus, also known as wild ginger, is an indigenous plant to South Africa widely known for its medicinal properties. However it has become endangered due to over harvesting. Micropropagation of plants *in vitro* was developed in order to bring back the species from the verge of extinction. To address this, a combination of parameters which included callus induction of rhizomes, corms and leaf bases as explants, in various media compositions, and a plant regeneration frequency formed the basis of evaluation. In this presentation we report that plant regeneration was achieved via somatic embryogenesis and organogenesis depending on the explant used. However, the rate of callus formation varied dramatically amongst the cultured explants.

doi:10.1016/j.sajb.2010.02.078

Efficacy of selected plant extracts against fungal pathogens of onion

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Fungal diseases may cause 75–100% onion crop losses per year. Treatment of the fungal infections depends on the prophylactic application of conventional fungicides which is labour intensive and expensive. They also pose detrimental effects to the environment and may cause cancer in humans when exposed to these fungicides. Plant extracts used as a bio-control agent has shown comparable activity to those of fungicides against fungal and bacterial diseases on crops. Leaf extracts of *Azadirachta indica*